Incidence of Coronary artery stenosis in medico legal autopsy upon the victims of sudden death

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Abstract

Coronary artery stenosis and the resultant cardiac ischemia is a leading cause of deaths worldwide. With studies all over the world in the topic, a study for the same in the geographical area of Kamrup, Assam is attempted. Males are most commonly involved. Increased incidence is found in the later decades of life. However the younger age group is also involved in a few cases. With greater education and urban residency cases are also seen on the higher side. Smoking and alcohol are the major risk factors. Businessmen and service holders are commonly affected. There is need of life style change in general public as well as cardiologists and treating physicians to think of early treatment, to avoid untoward complications.

Key words: Coronary artery stenosis, Males, Smoking and alcohol, Businessmen

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Introduction

Occlusion of coronary arteries with resultant cardiac ischemia is a very common cause of sudden death. The essential pathological process is atheroma or atherosclerosis of the coronary arteries.(1) The incidence of coronary disease is most commonly found from middle age onwards, but the effects of pathological process including sudden death are not infrequently found in younger age groups.(1) Ischaemic heart disease is responsible for approximately 70% of sudden deaths of which 50% have had no previously recognized clinical symptoms.

Coronary atherosclerosis is also sometimes called as the "captain of the men of Death". Cardiac scholars claim that atleast 80% of the normal lumen must be lost before myocardial necrosis occurs. However most forensic pathologists blame coronary atheroma for death where a significantly smaller percentage of the lumen is lost.(2)

The global burden of disease study reported 5.2 millions death from cardio vascular diseases in developed nation and 9.1 millions death from developing nations in the year 1990(3). By the year 2020 it is predicted that, there will be an increase by almost 75% in global cardio vascular disease burden affecting the developing countries.(4)

The prevalence of coronary atherosclerosis and cardio vascular event is highly variable according to age, sex and place. Rapid urbanization, changing dietary patterns, smoking and alcohol abuse, diabetes and hypertension compounded with high level of work stress are all pushing the community to this cardiovascular risk event.(5) Inspite of major advances of medical and interventional cardiology and emergency care the prevalence of coronary artery disease seems to remain high.(6)

The current study was undertaken to study the coronary atherosclerotic events in sudden death victims.

Anatomy and pathology of coronary artery

The right coronary artery arises from the right coronary sinus of the aorta, goes behind the pulmonary trunk and follows the right atrioventricular sulcus without giving off any major branch near its origin. A small marginal vessel gives off at right border of the heart, the main branch continues to the back of the heart where it becomes the posterior descending artery.

The left coronary artery arises from the left coronary sinus of the aorta and gives off the anterior descending branch which goes down from the interventricular septum to the apex, and the circumflex branch which follows the left atrioventricular sulcus to reach the back of the heart. There is developmental variation in the arrangement of the vessels in the posterior aspect of the heart between the left circumflex and right coronary artery.

The common site of stenosis with or without thrombosis are- first part of the anterior descending branch of left coronary artery within 2 cm of the origin, followed by proximal part of the right coronary artery, first part of the circumflex branch of left coronary artery, and the short main trunk of left coronary artery.(7)

Materials and Methods

Materials of study comprised of 100 cases selected randomly amongst total 2999 autopsies perfomed

during the period of 1st January to 31st December 2015 where death was sudden in the Department of Forensic Medicine, GMCH. This study encompasses the area in an around Kamrup district of Assam, India.

Selection criteria

Inclusion criteria: 100 randomly selected cases of sudden deaths.

Exclusion criteria: Putrefied or decomposed bodies were excluded.

Methods

1. Information regarding date, time and place of death etc. were obtained from investigating police officer or accompanying relatives.
2. History of suggestive past illness and past cardiovascular events and ongoing records was obtained from relatives or family members and accompanying police officers.
3. Socio demographic data were obtained from relatives of the victim.

Autopsy examination

A. External examination of the body and any associated findings are noted
B. Internal examination
   1. Cranial, thoracic and abdominal cavities were opened as per routine post mortem examination.
   2. Heart was examined for any discolouration, dilatation, adhesions including pericardial cavity for blood or other fluid. Weight of the heart was obtained.

Histopathological examination

1. 10% Formalin solution was used to preserve the heart.
2. Coronary arteries were sectioned transversely at 2-3mm interval all throughout their course. The sections were collected for next processing as below:

Rt (A)- Proximal 2 cm of the right coronary artery from ostium

Rt (B)- 2 cm beyond the ostium till the right lateral margin of the heart.

Rt (C)- Posterior descending artery

Lt (A)- Left main trunk

Lt (B)- Left anterior descending artery

Lt (C)- Left circumflex artery

1. Heart was cut open in the direction of blood flow, thickness of ventricular wall, valvular lesion etc noted. However severity of lumen patency were not observed in the study.
2. Cause as to the death was established and data collected were analysed statistically.

Observations and Results

Incidence: Out of 100 cases, incidence of coronary artery stenosis was found in 58 cases.

Age and sex incidence: In the present study the age groups 61-70 and 51-60 recorded the highest number of cases with 17 and 14 respectively. Males outnumbered the female cases with 43 cases to 15 cases. The youngest person to be involved was a 24-year-old male while the oldest was a 78-year-old female. Among the males 61-70 was the most involved group while among the females it was 51-60. The given table illustrates the findings.

Table showing age and sex distribution of cases of coronary artery stenosis

Age group	Male	Female	Total	Percentage of cases involved
0-10	0	0	0	0
11-20	0	0	0	0
21-30	3	2	5	8.62
31-40	6	1	7	12.07
41-50	8	1	9	15.52
51-60	8	6	14	24.14
61-70	14	3	17	29.31
71 and above	4	2	6	10.34
Total	43	15	58	100

Religion: 52 cases (89.66%) were of Hindu religion while the remaining 6 cases (10.34%) were of Muslim religion.

Urban and Rural Distribution: As shown in the figure below majority of the cases belonged to the urban areas.

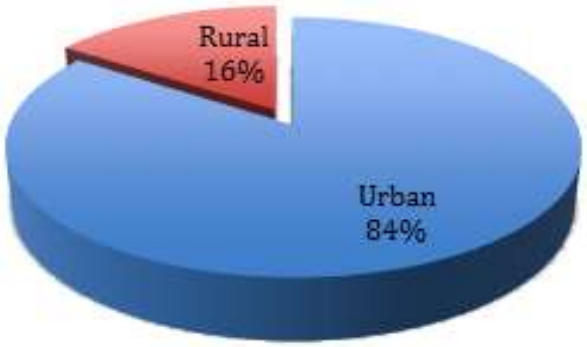

Fig. 1: Urban and rural distribution of cases

Educational qualification: The most cases with coronary artery stenosis involved the educated class, which consisted of matriculate to above graduate level. Very few cases of illiterate or under matriculate cases were noted.

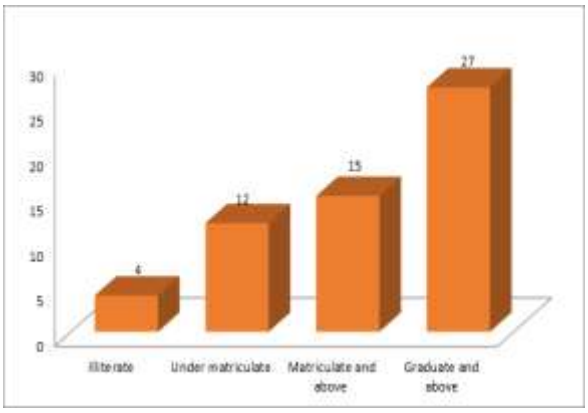

Fig. 2: Educational qualification distribution of cases

Personal Habits: Majority of the cases, (46) were associated with consumption of tobacco or smoking and alcohol or both. However 4 cases of coronary artery stenosis were not associated with consumption of either.

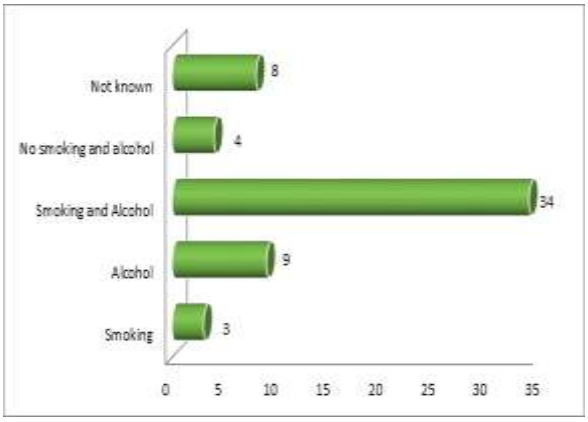

Fig. 3: Personal habits distribution of cases

Occupation: In the study it is observed that persons who were in business or self-employed were the most affected by coronary artery stenosis with 26 cases followed by those in service with 11 cases. Interesting aspect is the involvement of 4 young students. The other findings are as shown in the Fig.

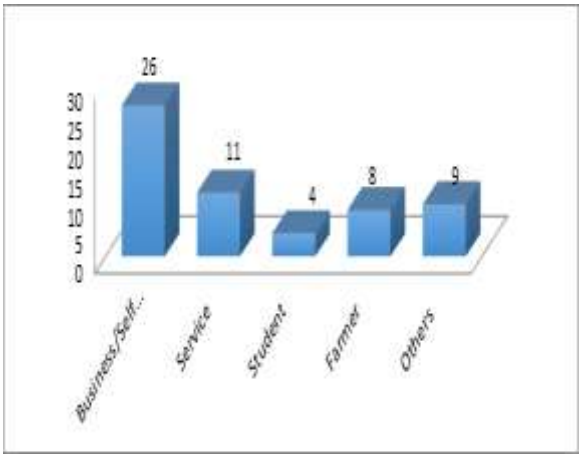

Fig. 4: Occupational distribution of cases

Discussion

In the present study, it was observed that out of 100 cases, 58% of cases showed coronary artery stenosis. This is almost comparable to observation of workers like those of Wig KL et al[8] (64%), Subramaniam R et al[9] (62%) and Singh V et al[10] (68%). However Garg M et al [11] (46.4%) reported lower incidence in their study.

The study is similar to the findings of the work of Garg M et al[11] and Dhruba GA et al[12] who reported higher incidences in the sixth and seventh decades of life.

The higher incidence in males compared to females is consistent with all the previous work on the incidence of coronary artery stenosis. This can be attributed to the fact that males are more exposed to stress and vulnerable to the influences of smoking and alcohol.

The higher incidence of cases in urban population is consistent with the findings of Konishi M et al[13] who reported an increasing trend of myocardial infarction in urban population. This is mostly due to the lifestyle changes in urban population with a sedentary lifestyle and changed dietary habits.

The trend of increased educational qualification being associated with higher incidence of the disease is in agreement with the findings of Sarvotham SG and Berry JN[14]. However Gupta R et al[15] observed that illiteracy and less education was associated with an increased exposure to the risk factors leading to higher incidence. This difference can be attributed to the fact that low educational status people donot usually report sudden death cases so as to warrant a medicolegal autopsy in the study area leading to such results in the study.

In regards to occupation it is observed that well earning or service holders were the more affected. This is contrary to the findings of Gupta R et al[16] who reported higher incidence in low occupational population. It can be due to the fact that the study area being a city the population is exposed to the risk factors more.

The personal habits show greater incidence among the population with active use of tobacco and alcohol, which is in agreement with most of the studies.

Conclusion

The study showed unexpectedly high prevalence of coronary artery stenosis in the region. Though the incidence of is more in males as compared to females, but in both sexes it is alarming. Age has a dominant influence. This study highlights the importance of cardiovascular risk factors screening from early ages of third decades. Smoking and alcoholism can accelerate the development of coronary artery stenosis. All the observation in the present study showed that the incidence of coronary artery stenosis is a matter of concern. There is need of life style change in general public as well as cardiologists and treating physicians to think of early treatment, to avoid untoward complications and awareness towards the disease.

Conflict of interest: None

Ethical clearance: From Institutional Ethical Committee

Source of funding: Self

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